

What is Claimed is:

1. A method for synchronizing frames by using pilot patterns in a compressed mode, comprising the steps of:

5 (a) puncturing pilot bit sequences of frame synchronization words to be transmitted over one frame as many as desired number of slots;

(b) receiving a series of codes of the punctured frame synchronization words;

(c) restoring the frame synchronization words in frames by using correlation of the received series of codes;

10 (d) attaining a frame synchronization with respect to a channel by using correlation of the restored frame synchronization words.

2. A method as claimed in claim 1, wherein the step (c) includes the steps of;

classifying a plurality of codes into classes each with a fixed number of codes, and

restoring bits of the codes not transmitted owing to the puncturing by using a relation

15 $C_{i,j} = -C_{i+1(j+7) \bmod 15}$ of a code pair in each of the classes, wherein $C_{i,j}$ represents a (j)th slot bit of a pilot bit pattern C_i , $i = 1, 3, 5, 7$, and $j = 0 \sim 14$.

3. A method as claimed in claim 1, wherein the step (c) includes the steps of;

classifying a plurality of codes into a number of classes, and

restoring bits of the codes not transmitted owing to the puncturing by using a relation $C_{i+1,j} = -C_{i,(j+8)\bmod 15}$ of a code pair in each of the classes, wherein $C_{i,j}$ represents a (j)th slot bit of a pilot bit pattern C_i , $i = 1, 3, 5, 7$, and $j = 0 \sim 14$.

- 5 4. A method as claimed in claim 1, wherein the step (d) includes the steps of;
- classifying the restored frame synchronization words into a number of classes of a frame synchronization words pair, and
- implementing frame synchronization of the channel by using at least one of cross correlation functions of the frame synchronization word pair in each of the classes.

- 10 5. A method as claimed in claim 4, wherein, if the restored frame synchronization words are eight, which can be classified into the following four classes,
- $E = \{C1, C2\}$, $F = \{C3, C4\}$, $G = \{C5, C6\}$, $H = \{C7, C8\}$,
- each of code pairs in each of the classes can be expressed in a cross correlation

- 15 function as the following equations.

$$R_{i,j}(\tau) = \begin{cases} -15, & \tau = 7 \\ 1, & \tau \neq 7 \end{cases}$$

$$R_{j,i}(\tau+1) = \begin{cases} -15, & \tau = 7 \\ 1, & \tau \neq 7 \end{cases}$$

Where $i, j = 1, 2, \dots, 8$.

6. A method as claimed in claim 1, wherein the step (d) is implemented by at least one of auto-correlation function of the frame synchronization words.

7. A method as claimed in claim 6, wherein, if the restored frame synchronization words are eight, which can be classified into the following four classes,

$E = \{C1, C2\}, F = \{C3, C4\}, G = \{C5, C6\}, H = \{C7, C8\},$

each of code pairs in each of the classes can be expressed in an auto-correlation function as the following equation.

$$R_i(\tau) = \begin{cases} 15, & \tau = 0 \\ -1, & \tau \neq 0 \end{cases}, \quad i, j = 1, 2, \dots, 8.$$

8. A method as claimed in claim 1, wherein the step (d) is implemented by using both the auto-correlation and cross correlation of the restored frame synchronization words.

9. A method as claimed in claim 8, wherein the step (d) includes the steps of;

(a) auto-correlating the restored frame synchronization words which are pilot bit sequences, to provide a final auto-correlation result,

(b) cross correlating the restored frame synchronization words, to provide a final cross correlating result,

(c) negatively summing the auto-correlation result and the cross correlation result,

(d) comparing the summed correlation results to a preset threshold value β ,

(e) determining a frame synchronization success for the received channel according to a result of the comparison, and

(f) reporting the result of the determination to an upper layer.

10. A method as claimed in claim 9, wherein, in the cross correlating step, the restored frame synchronization words are classed into a number of classes corresponding to frame synchronization word pairs, and one word of the frame synchronization word pair in one class is the other word being cyclic shifted by 7 bits and inverted.

11. A method as claimed in claim 9, wherein the step (c) includes the steps of;
delaying the auto-correlation result for a certain slot time period while the cross
10 correlation is carried out, and
negatively summing the auto-correlation result and the cross correlation result.

12. A method as claimed in claim 9, wherein the threshold value β is set to a value equal to '0' or greater than '0' depending on an SNR ratio.

13. A method as claimed in claim 9, wherein the step (a) includes the steps of;
classifying the restored frame synchronization words into a number of classes corresponding to frame synchronization word pairs, and
correlating a first frame synchronization word and a second frame synchronization
20 word in each class, to provide a first auto-correlation result and a second auto-correlation result, and

summing the first auto-correlation result and the second auto-correlation result, to provide the final auto-correlation result.

14. A method as claimed in claim 9, wherein the step (b) includes the steps of;

classifying the restored frame synchronization words into a number of classes corresponding to frame synchronization word pairs, and

cross correlating a second frame synchronization word with respect to a first frame synchronization word in each class, to obtain a first cross correlation result, and cross correlating the first frame synchronization word with respect to the second frame synchronization word in each class, to obtain a second cross correlation result, and

summing the first cross correlation result and the second cross correlation result, to obtain a final cross correlation result.